



Aalborg Universitet

AALBORG UNIVERSITY
DENMARK

Hydrogen-selective silica-base membranes

structure, permeability and stability

Boffa, Vittorio; Yue, Yuanzheng; Magnacca, Giuliana

Publication date:
2014

Document Version
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Boffa, V., Yue, Y., & Magnacca, G. (2014). *Hydrogen-selective silica-base membranes: structure, permeability and stability*. Abstract from 1st Joint Meeting of DGG – ACerS GOMD, Aachen, Germany.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Hydrogen-selective silica-base membranes: structure, permeability and stability

Vittorio Boffa,¹ Yuanzheng Yue¹ and Giuliana Magnacca,²

¹Section of Chemistry, Aalborg University, DK-9000 Aalborg, Denmark.

²Dipartimento di Chimica, Università di Torino, 10125 Torino, Italy.

Amorphous silica membranes fabricated by the sol-gel method show high hydrogen permeability and at the same time are almost impermeable to larger gas molecules as carbon dioxide and methane. In reason of that, these devices are attractive for developing highly efficient hydrogen separation systems. Large energy savings are expected by substitution of the traditional cryo-distillation and adsorption processes by hydrogen-selective silica membranes. Despite that, silica membranes have not been commercialized yet, mainly due to high concerns about their stability. Indeed, hydrothermal conditions, which are typical for hydrogen-forming processes, have been reported to be detrimental to both hydrogen permeability and selectivity of silica membranes. The stability of silica membranes can be improved by transition metal oxide doping. However, the structure and the mechanisms underneath hydrothermal aging of silica membranes are not well understood yet, and the development of doped silica membranes is still mainly attained by an empirical approach. This study provides novel information about structure, permeability and stability of silica membranes, and therefore provides new tools for developing highly stable silica-based membrane materials [1,2].

1. V. Boffa, G. Magnacca, L. Bjerg Jørgensen, A. Wehner, A. Dörnhöfer, Y. Yue, **2013**, *Toward the effective design of steam-stable silica-based membranes*, Microporous and Mesoporous Materials 179, 242-249.
2. M. Facciotti, V. Boffa, G. Magnacca, L.B. Jørgensen, P.K. Kristensen, A. Farsi, K. König, M.L. Christensen, Y. Yue, **2014**, *Deposition of thin ultrafiltration membranes on commercial SiC microfiltration tubes*, Ceramics International, 40, 3277–3285.